

Work Order ID 71487

Tuesday, July 05, 2011 7:43:45 AM

Page 1

Item ID: D212-664-201 Accept

Revision ID: ~~0R~~

Item Name: Crosstube Aft

Start Date: 7/5/2011 Start Qty: 1.00

Required Date: 7/25/2011 Req'd Qty: 1.00

Reference:

Cust Item ID:

Customer:

Approvals: Process Plan: CL Date: 11/07/05 Tooling: _____ Date: _____

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Run Start

Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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Draw Nbr	Revision Nbr <u>ELW11-664</u>								
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D212-664-241	Rev D <u>OK 11.07.05</u>								
--------------	--------------------------	--	--	--	--	--	--	--	--

100		0.00							
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DC

Document Control

DOCUMENT CONTROL

Memo

Photocopy bluefile and create labels as per PPP D212-664-201

CHG004

CHG 005

OK for BG 11/08/05
Fulbright

110		0.00							
-----	--	------	--	--	--	--	--	--	--



Packaging

Packaging

Pick Kit
Packaging

Memo

11-7-27

120		0.00							
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CNC Bend 2

CNC Alpha 160 Bender

BENDING MACHINE - CROSSTUBES

Memo

Bend tube as per Dwg D212-664-241 using CNC bender program 212-
aft

11-7-27

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

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Run Start

Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

130 QC15- Crosstube Dimensional Check 0.00



QC Memo 0.00

Quality Control

140 Crosstubes 0.00



Crosstubes Memo 0.00

Crosstubes

1-Drill pilot holes in tube as per Dwg D212-664-241 using drill Jig DT8550, DT8551, drill table DT8577 and locate tower holes #8 as per QSI0010.

2-Ream hole to finish size in tube as per Dwg D212-664-241 using drill Jig DT8550 & DT8551. Check dimensions between holes, both sides on both cuffs, to ensure alignment with saddle holes.

3-Scribe part # and batch # using vibrating stylus as per Dwg D212-664-241

4-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D212-664-241

Handwritten: The SMO 11-07-27

W/O:		WORK ORDER CHANGES					
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Setup Start
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 Customer:

Approvals: Process Plan: Date: Tooling: Date:
 QC: Date: SPC (Y/N): Date:

Run Start
 Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

150	Crosstubes Chemical Conversion	0.00							
HandFXtube	Memo	0.00							
Hand Finishing Crosstubes	Chemical Conversion Coat as within 24 hours of bending and drilling								

TU
 SAD 11-07-28

160	QC3- Inspect Part Finish	0.00							
QC	Memo	0.00							
Quality Control									

11 07 28 (1)

170	QC5- Inspect part completeness to step on W/O	0.00							
QC	Memo	0.00							
Quality Control									

11 07 28 (1)

W/O:		WORK ORDER CHANGES					
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 Reference:

Setup Start
 Stop
 Cust Item ID:
 Customer:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____
 QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Run Start
 Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
210 SprayPaint Spray Painting	Spray Painting per QSI005 4.2 SprayPaint Memo 1-Prime inside and outside crosstube as per QSI 005 4.2 2-Paint outside crosstube as per DEO D212-667-241 with White Imron as per QSI 005 4.2 PRIME: Start Time: _____ Finish Time: _____ PAINT: Start Time: _____ Finish Time: _____	0.00 0.00							11-08-03
220 QC Quality Control	QC14- Inspect Spray Paint Memo Then, Wrap in plastic bag to protect from scratches	0.00 0.00							8 u108104

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Setup Start

Stop

Cust Item ID:

Customer:

Run Start

Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

230



Crosstubes

Crosstubes

Crosstubes

Memo

1- Lightly scuff the bonded area using a 320 grit sand paper and clean the area with 41058 wash 'n' wipe

2-Install supports with magnobond as per OSI 015 Adhere for for 12 Hrs

A/R 6398 Magnobond Batch: 118234
Expiry Date: 11-11

3-Install clamps as per Dwg D212-664-241. Torque clamps to 80-100 in lb.

★ USE PROSEAL
SEE ATTACHED

25 11-08-04

240



QC

Quality Control

QC5- Inspect part completeness to step on W/O

Memo

1 11-08-05

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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Reference:




Cust Item ID:

Customer:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____
QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Run Start

Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
250  Packaging Packaging	Pick Kit Memo	0.00 0.00						11/8/5	
260  QC Quality Control	QC4- 100% Inspect kits for completeness Memo	0.00 0.00						TH	
270  Packaging Packaging	Packaging Memo Identify and pack for shipping as per PPP D212-664-201	0.00 0.00						11/8/5	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Run Start

Stop

Sequence ID/
Work Center IDOperation
DescriptionSet Up/
Run Hours

Tool ID

Tool #

Plan
CodeAccept
QtyReject
QtyReject
NumberInsp.
Stamp

280

QC21- Final Inspection - Work Order Release

0.00



QC

Memo

0.00

Quality Control

CA 11/08/05

12-08-5

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
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NOTE: Date & initial all entries

Picklist Print

Page 1

Tuesday, July 05, 2011 7:43:41 AM

Work Order ID: 71487

Parent Item: D212-664-201

Parent Item Name: Crosstube Aft

Start Date: 7/5/2011

Required Date: 7/25/2011

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:E 04.02.16 Reformat K/DS
 IPP Rev:F 06-03-29 Remove Coments on Pick List JLM
 IPP Rev:G 07-04-30 As per Rev C JLM
 IPP Rev:H 08-05-22 up date Qty of rubber cushion DD verified by:EC

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D212-664- 201TRNRevC		Manufactured	No			110	Each	0.0000	1	1			
Crosstube Turning Detail													
D3595-063-530		Manufactured	No			230	Each	74.0000	2				
RUBBER CUSHION													

B68804

① DD 11-7-27
 7.4
 8T 11-08-04

Location	Loc Qty	Loc Code
LG	56	
70067	56	
LG055	18	
63407	6	
67185	12	

x4

D2940-1
 Support

Manufactured No

230

Each

17.0000

2

2

72587

8T 11-08-04

Location	Loc Qty	Loc Code
LG	17	
70737	17	

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Picklist Print

Tuesday, July 05, 2011 7:43:42 AM

Page 2

Work Order ID: 71487

Parent Item: D212-664-201

Parent Item Name: Crosstube Aft

Start Date: 7/5/2011

Required Date: 7/25/2011

Start Qty: 1.00

Required Qty: 1.00

MS21920-28

Purchased

No

230

Each

55.0000

4

4



Clamp(per MIL-DTL-8783C)



ET 11-08-06

Location

Loc Qty

Loc Code

FG

5

105884

5

LG050

50

116839

2

117344

5

117998

43

D3428-1

Manufactured

No

250

Each

20.0000

1



Placard



X 1

Location

Loc Qty

Loc Code

ST053

20

68920

10

71168

10

MS21042L6

Purchased

No

250

Each

341.0000

6

6



Nut



1

Location

Loc Qty

Loc Code

ST300

341

117343

41

117677

200

118078

100

AN960JD616

NAS1149D0663J

Purchased

No

250

Each

0.0000

18

18



Washer



6
M110378 11/15

Tuesday, July 05, 2011 7:43:42 AM

Shop Packet Print

Page 2

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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Picklist Print

Tuesday, July 05, 2011 7:43:42 AM

Page 3

Work Order ID: 71487

Parent Item: D212-664-201

Parent Item Name: Crosstube Aft



Start Date: 7/5/2011

Required Date: 7/25/2011

Start Qty: 1.00

Required Qty: 1.00

AN6-40A

Purchased

No

250

Each

96.0000

4

4



Bolt

Location

Loc Qty

Loc Code

ST340

46

117366

46

ST343

50

117688

50

AN6-41A

Purchased

No

250

Each

58.0000

2

2



Bolt

Location

Loc Qty

Loc Code

ST344

58

117366

48

118191

10

W/O:		WORK ORDER CHANGES					
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NOTE: Date & initial all entries

DART AEROSPACE LTD		Work Order:	71487
Description: Crosstube Assembly (205/212 High Aft)		Part Number:	D212-664-241
Inspection Dwg: D212-664-241 Rev: D		Page 1 of 1	

FIRST ARTICLE INSPECTION CHECKLIST

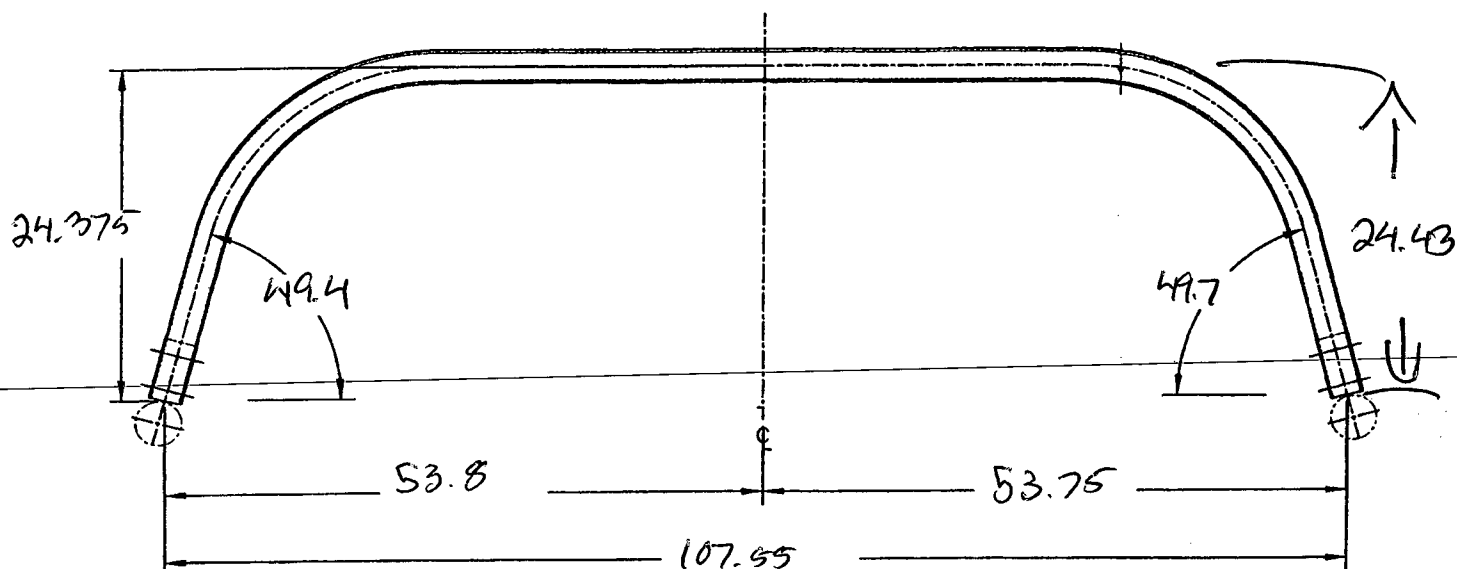
Inspection Sheet Drawing Dimension		Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	0.200	+/-0.010					
	R0.063	+/-0.010					
	2.990	+0.005/-0.000					
	5.237	+/-0.030					
	2.600	+0.005/-0.000					
	2.686	+0.005/-0.000					
	2.770	+0.005/-0.000					
	2.854	+0.005/-0.000					
	2.938	+0.005/-0.000					
	3.021	+0.005/-0.000					
	3.133	+0.005/-0.000					
	3.179	+0.005/-0.000					
SIDE B	0.200	+/-0.010					
	R0.063	+/-0.010					
	2.990	+0.005/-0.000					
	5.237	+/-0.030					
	2.600	+0.005/-0.000					
	2.686	+0.005/-0.000					
	2.770	+0.005/-0.000					
	2.854	+0.005/-0.000					
	2.938	+0.005/-0.000					
	3.021	+0.005/-0.000					
	3.133	+0.005/-0.000					
	3.179	+0.005/-0.000					
	124.362	+/-0.020					

Measured by:		Audited by:		Preliminary Approval:	N/A
Date:		Date:		Date:	N/A

Rev	Date	Change	Revised by	Approved
A	05.04.27	New Issue (P/O D412-664-201)	KJ/JLM	
B	06.03.09	Tolerance for 5.237 was +/-0.001	KJ/JLM	
C	07.05.08	Dwg Rev. updated	KJ/JLM	
D	10.08.03	Dimension 124.362 was 124.36	KJ	

DART AEROSPACE LTD	Work Order:	71487.
Description: Crosstube High Aft (205/212)	Part Number:	D212-664-201
Inspection Dwg: D212-664-241	Rev: D	Page 1 of 1

Required Dimension	Min	Max
Height	24.17	24.43
1/2 Span	53.59	53.85
Angle	49	52
Total Span	107.18	107.70



25 pages	Comments

QC15 Inspection	11-07-27
Date	

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	07.05.08	Dimensions updated per Dwg rev. C	KJ/JLM	
C	10.04.01	Dwg Rev updated	KJ	

D212-664-241 7487 ECN H-614

D

Item	Qty -241	Qty -241B	Part Number	Description
1	X		D212-664-241	CROSSTUBE ASSEMBLY (205/212 HIGH AFT)
2		X	D212-664-241B	CROSSTUBE ASSEMBLY (214 HIGH AFT)
3	1	1	D6006-129	CROSSTUBE
4	2	2	D2940-1	SUPPORT
5	4	4	D3595-063-530	RUBBER CUSHION
6	4	4	MS21920-28	CLAMP (OR MS21920-30)
7	A/R	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6006-129
FINISHED LENGTH = 124.362±0.020
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D212-664-XXX" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
- 7) WEIGHT: D212-664-241 = 44.2 lbs (PER IIN-D212-664)
D212-664-241B = 44.2 lbs (PER IIN-D212-664)
- 8) PART IS SYMMETRIC ABOUT CENTERLINE.
- 9) RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 5 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 12) INSTALL D2940-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2940-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 13) INSTALL MS21920-28 CLAMPS (OR -30) WITH D3595-063-530 RUBBER CUSHIONS TO SECURE THE D2940-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE OF CROSSTUBE SUPPORT.
- 14) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

ECN H-614
11.08.25
UNDER REVIEW
11.08.13

DEO ATTACHED

RELEASED
2009-10-29
WY

D	REFORMAT/REVISE GENERAL NOTES/PART LIST; REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS; ADD -241B (ZN D4-2, B4-2); REMOVED REF & ADD TOLERANCES (ZN D8-3 & C4-3, C6-3 & A8-3); RELOCATED FLAG #6 PER PAR 08-046 (ZN A5-3); MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4	RF	09.09.30
C	REMOVE -1009 ABRASION STRIP; ADD MAGNOBOND 6398, CUSHION, REVERSE CLAMPS	PH	07.03.08
B	ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES	PH	05.02.04
A	NEW ISSUE	PH	00.12.12
REV.	DESCRIPTION	BY	DATE
DESIGN	PH	DART AEROSPACE LTD	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	PH	DRAWING NO.	REV. D
MFG. APPR.	IS	D212-664-241	SHEET 1 OF 4
APPROVED	PH	TITLE	SCALE
DE APPR.	PH	CROSSTUBE ASSY (205/212 HI AFT)	NTS
DATE	09.09.30	COPYRIGHT © 2000 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSES OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

8 7 6 5 4 3 2 1

12 13 15
D2940-1 SUPPORT
MS21920-28 CLAMP, 2X
D3595-063-530 RUBBER CUSHION, 2X
2 PL

A5-2

A

14.00 (-241)
OR 13.75 (-241B)

D

D212-664-601
BENT TUBE

SYM

D212-664-241/-241B
ASSEMBLY DETAIL

D

ECO #11-614
11.07.26
UNDER REVIEW
UP 11.06.13

DEO ATTACHED

RELEASED
2009-10-28

12
APPLY MAGNOBOND
BETWEEN D2940-1 AND
CROSSTUBE

D2940-1 SUPPORT, REF

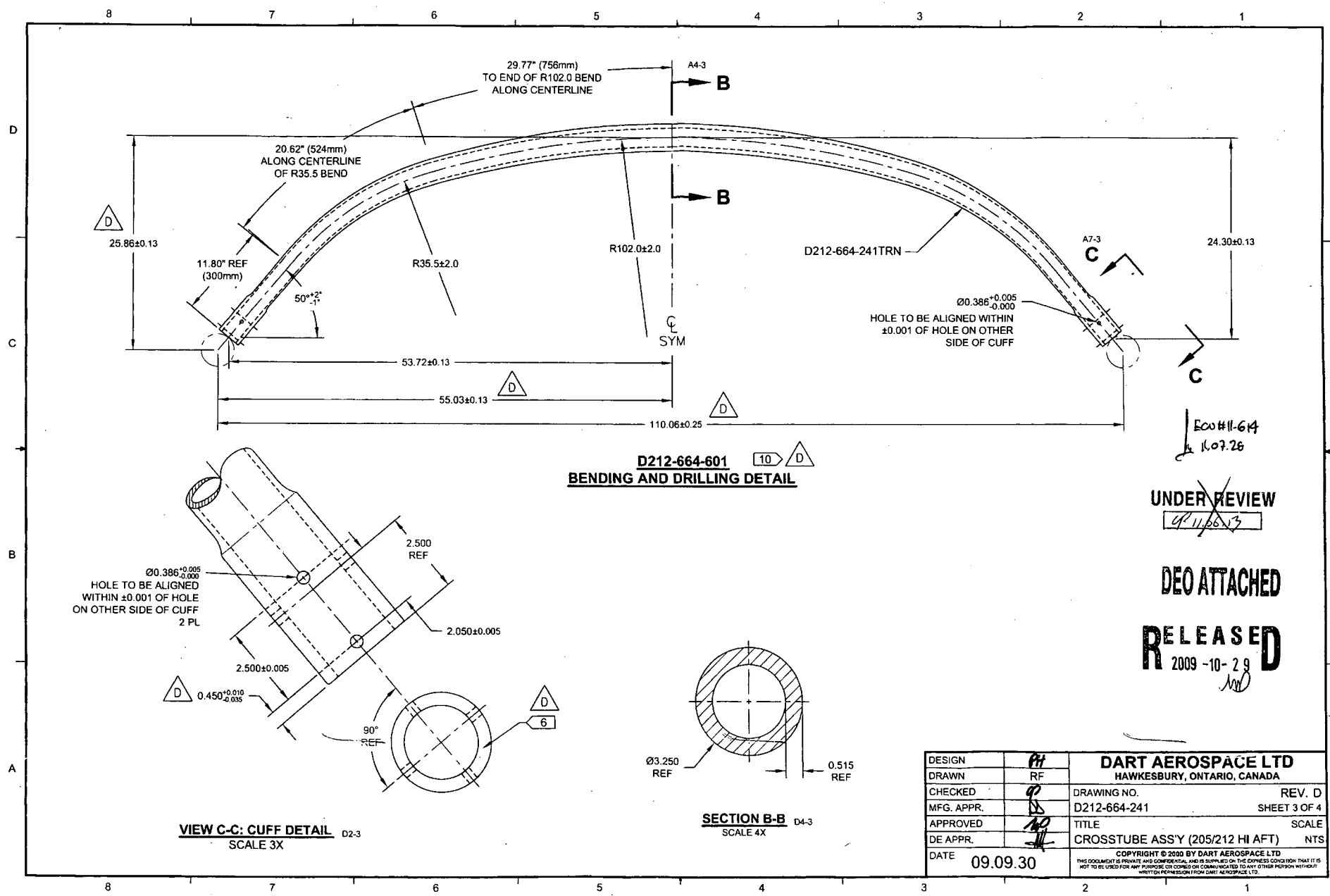
13 15
MS21920-28
CLAMP, REF

D3595-063-530 RUBBER CUSHION
UNDER CLAMP, REF

SECTION A-A D6-2
SCALE 4X

DESIGN	PH	DART AEROSPACE LTD	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	Q	DRAWING NO.	REV. D
MFG. APPR.	DS	D212-664-241	SHEET 2 OF 4
APPROVED	AP	TITLE	SCALE
DE APPR.	W	CROSSTUBE ASSY (205/212 HI AFT)	NTS
DATE	09.09.30	<small>COPYRIGHT © 2000 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSES OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.</small>	

8 7 6 5 4 3 2 1



E00 #11-614
 11.07.26

UNDER REVIEW
 11.06.13

DEO ATTACHED

RELEASED
 2009-10-29

DESIGN	PH	DART AEROSPACE LTD	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	Q	DRAWING NO.	REV. D
MFG. APPR.	Q	D212-664-241	SHEET 3 OF 4
APPROVED	Q	TITLE	SCALE
DE APPR.	Q	CROSSTUBE ASS'Y (205/212 HI AFT)	NTS
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DRAWING NO. D212-664-241	TITLE CROSSTUBE ASSY (205/212 HI AFT)	REV. D	DART AEROSPACE LTD ENGINEERING ORDER		D.E.O. NO. D212-664-241-D-1	SHEET NO. SHEET 1 OF 2	SCALE NTS
DRAWN	CHECKED	MFG. APPR.	APPROVED	DE APPR.			
DATE 11.04.07	DATE 11.04.11	DATE 11.04.12	DATE 11/04/12	DATE 11.04.12			

PURPOSE:

ADD AN INSPECTION WINDOW TO UNDERSIDE OF CROSSTUBE.

CHANGE:

NOTES 2 OF SHEET 1 IS AMENDED AS FOLLOWS:

IS:

- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
MASK UNDERSIDE OF CROSSTUBE AS SHOWN (HATCHED AREA) AND
PAINT OUTSIDE PER DART QSI 005 4.2
REMOVE MASKING AND APPLY CLEAR COAT

WAS:

- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2

RELEASED
2011-04-18

UNDER REVIEW

11.06.13

ECN 11-614

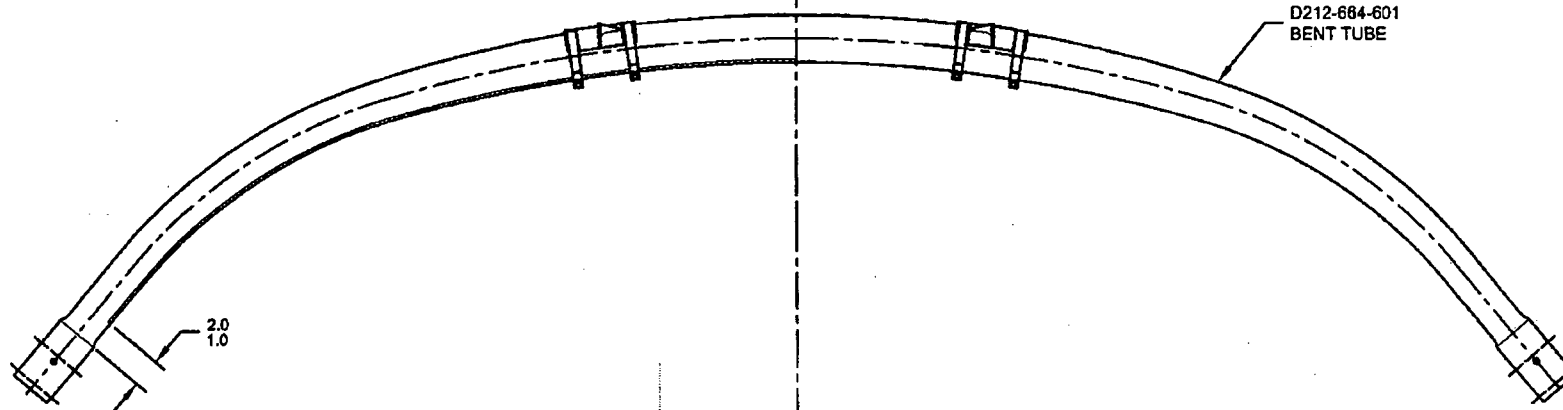
11.07.28

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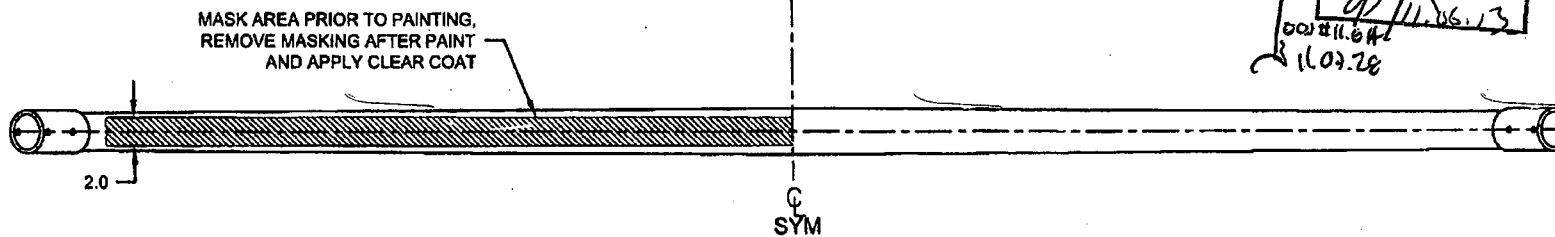
DRAWING NO. D212-664-241	TITLE CROSSTUBE ASSY (205/212 HI AFT)	REV. D	DART AEROSPACE LTD ENGINEERING ORDER		D.E.O. NO. D212-664-241-D-1	SHEET NO. SHEET 2 OF 2	SCALE NTS
DRAWN	CHECKED <i>UP</i>	MFG. APPR. <i>E</i>	APPROVED <i>MD</i>	DE APPR. <i>MD</i>			
DATE 11.04.07	DATE 11.04.11	DATE 11.04.12	DATE 11/04/12	DATE 11.04.12			

IS:



WAS:

**D212-664-241/-241B
ASSEMBLY DETAIL**



RELEASED
2011-04-18

UNDER REVIEW

UP 11.06.13
D212-664-241
11.07.28

DRAWING NO. D212-664-241	TITLE CROSSTUBE ASS'Y (205/212 HI AFT)	REV. D	DART AEROSPACE LTD ENGINEERING ORDER		D.E.O. NO. D212-664-241-D-2	SHEET NO. SHEET 1 OF 1	SCALE NTS
DRAWN <i>q2</i>	CHECKED <i>ASS</i>	MFG. APPR. <i>DS</i>	APPROVED <i>MD</i>		DE APPR. <i>MD</i>		
DATE 11.07.15	DATE 11.07.20	DATE 11.07.21	DATE 11/07/21		DATE 11-07-21		

PURPOSE:

REPLACE MAGNOBOND WITH PROSEAL.

CHANGE:

IS:

Item	Qty -241	Qty -241B	Part Number	Description
7	A/R	A/R	PROSEAL 890 B-2	SEALANT, AMS-S-8802 CLASS B-2

WAS:

7	A/R	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)
---	-----	-----	----------------	---

NOTE 12 & 15, SHEET 1 IS AMENDED AS FOLLOWS:

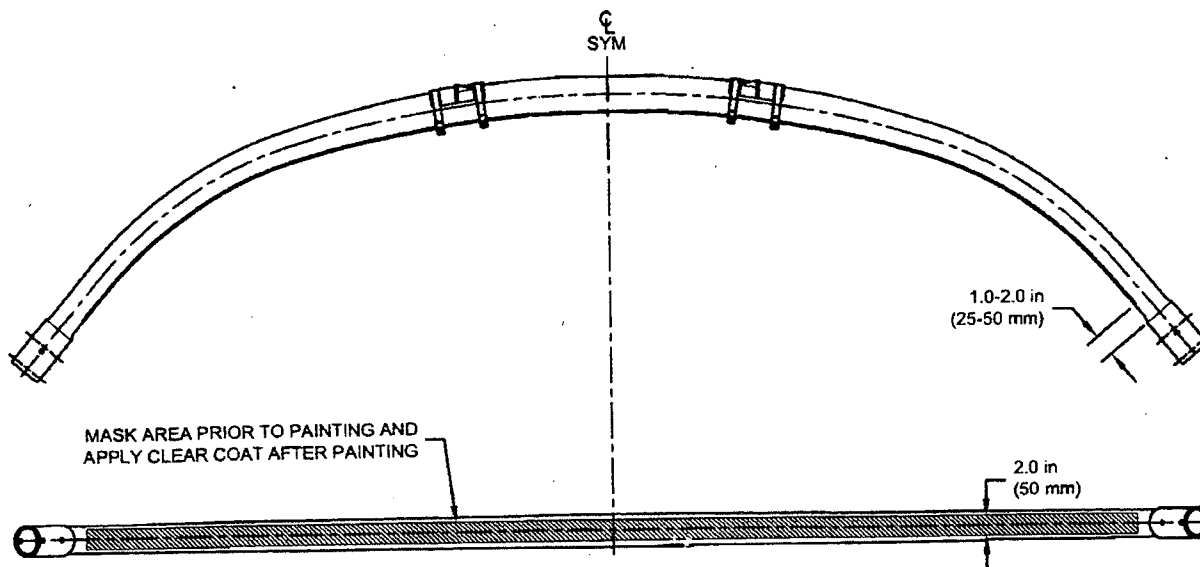
IS:

- 12) TO INSTALL D2940-1 SUPPORT: ABRASE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.04" TO 0.07" THICK LAYER OF PROSEAL 890 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. **PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.**

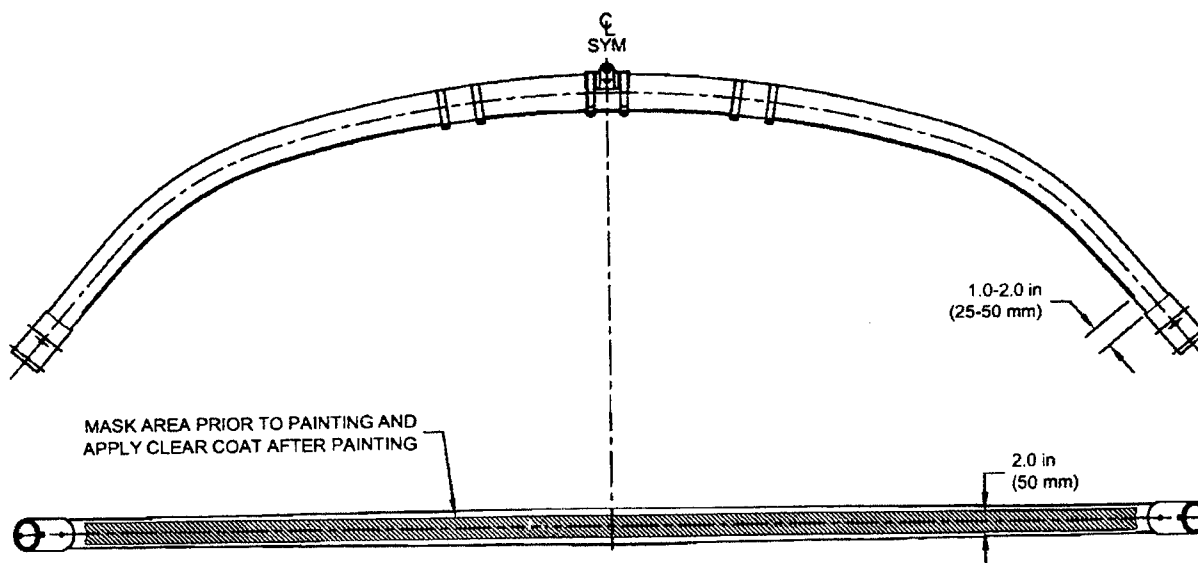
WAS:

- 12) INSTALL D2940-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2940-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

RELEASED
2011-07-28
MD



**FIGURE 1 - INSPECTION WINDOW ON
D212-664-101/-201 CROSSTUBES**



**FIGURE 2 - INSPECTION WINDOW ON
D412-664-203 CROSSTUBES**



C/L 1110705
W10: 71487

CANADA
DEPARTMENT OF TRANSPORT
AIRCRAFT CERTIFICATION
BRANCH
DAO # 01-O-01

APPROVED
BY: *[Signature]*
D. SHEPHERD (DE # 02)

DATE: 11.04.01
CERT. NO.: SH01-9
ISSUE NO.: 3

DESIGN	<i>[Signature]</i>	DART AEROSPACE LTD	
DRAWN	<i>[Signature]</i>	HAWKESBURY, ONTARIO, CANADA	
CHECKED	<i>[Signature]</i>	DRAWING NO.	REV. A
MFG. APPR.	<i>[Signature]</i>	DSI 9549	SHEET 2 OF 3
APPROVED	<i>[Signature]</i>	TITLE	SCALE
DE APPR.	<i>[Signature]</i>	D212-664 FINISHING CHANGE	NTS
DATE	11.04.01	COPYRIGHT © 2011 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	
11.07.05	230	BOND SUPPORTS USING PROSEAL PER ATTACHED PROCEDURE (EMAIL)	BE	1 08 04		 11.07.05 051612	 11.08.05	

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Chris Provencal

From: David Shepherd <dshepherd@dartaero.com>
Sent: Wednesday, June 15, 2011 3:05 PM
To: 'Chris Provencal'
Cc: 'Mike Petsche'; 'Dan Stow'; 'Eric Downing'; 'Linda Lacelle'
Subject: RE: Procedure for installing supports.

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Chris,

I agree with your procedure outlined below. It is our preference to leave the paint on the crosstube if we can for added corrosion protection (and for ease of manufacture). If Dan's final testing shows there is a big difference between a painted/unpainted crosstube, then we will switch to alodine only on the crosstube.

David

From: Chris Provencal [mailto:cprovencal@dartaero.com]
Sent: Wednesday, June 15, 2011 11:24 AM
To: 'David Shepherd'
Cc: 'Mike Petsche'; 'Dan Stow'; 'Eric Downing'
Subject: RE: Procedure for installing supports.

David,

Can I confirm that this is the agreed procedure for all newly manufactured tubes with off-center supports:

- Scuff paint under support, clean with MEK
- Completely remove any finish on support (if present), scuff bottom surface of support, clean with MEK
- Apply a 0.04" – 0.07" layer of Proseal 890 class B-2 on bottom of support and install wet.
- Install clamps and torque per dwg
- Clean up excess proseal
- Let cure for 72 hours after installation, recheck torque.

Chris

From: David Shepherd [mailto:dshepherd@dartaero.com]
Sent: Tuesday, June 14, 2011 10:59 AM
To: 'Chris Provencal'
Cc: 'Mike Petsche'; 'Dan Stow'; 'Eric Downing'
Subject: RE: Procedure for installing supports.

Made a couple of small changes.

- Remove finish on xtube in area of support down to alodine finish.
 - Touch up alodine on xtube in affected area
 - Completely remove any finish on support, scuff bottom surface of support
 - Apply a 0.04" – 0.07" layer of Proseal 890 class B-2 on bottom of support and install wet.
 - Install clamps and torque per dwg
- 1



ACUREN

LIQUID PENETRANT TEST REPORT

P- 05625

CLIENT

ATTENTION

ADDRESS

PROJECT

ITEM(S) EXAMINED

DATE

ACUREN JOB NO.

POW/NO.

WORK LOCATION

ACCEPTANCE STD.

PAGE

OF

TIME

AM

PM

DAI AEROSPACE
LYNDA/CHARITAE/IAN
1270 ABERDEEN RD
HAWKETBURY ON

July 29/2011
183-11-02163
1146048

AS ADDRESS

ASTM A174/ASTM E33

REV./DATE 2005

PT WET FLUORESCENT ON 9 CROSSTUBES & 4 RAPPELS

JOB DESCRIPTION

PROCEDURE NO. LT-002 REV./DATE 2003

TECHNIQUE NO. LT-002 REV./DATE 2003

ART NO.

MATERIAL

ALUMINUM

THICKNESS

N/A

COPE

PERFORMED A WET FLUORESCENT LIQUID PENETRANT INSPECTION ON 100% OF THE
EXTERNAL SURFACE ON ITEMS MENTIONED BELOW

TEST DETAILS

METHOD	<input checked="" type="checkbox"/> FLUORESCENT	<input type="checkbox"/> VISIBLE	<input checked="" type="checkbox"/> WATER WASH	<input type="checkbox"/> SOLVENT REMOVABLE	<input type="checkbox"/> POST EMULSIFIED
FAMILY BRAND	MAGNAFLUX		BLACK LIGHT S/N	13798	<input type="checkbox"/> OUTPUT > 1000 μ W/cm ²
PENETRANT	2A-67	MINIMUM DWELL TIME	10	MIN.	<input type="checkbox"/> FLASHLIGHT <input type="checkbox"/> TROUBLELIGHT
PENETRANT REMOVER	H ₂ O	MINIMUM DRY TIME	>10	MIN.	<input type="checkbox"/> OUTPUT > 100 fc @ SURFACE
DEVELOPER	SKD-53	MINIMUM DWELL TIME	10	MIN.	OTHER
DEVELOPER TYPE	<input checked="" type="checkbox"/> NON AQUEOUS	<input type="checkbox"/> AQUEOUS	<input type="checkbox"/> DRY		LIGHT METER S/N
					CAL DUE DATE

TEST SURFACE

SURFACE CONDITION	<input type="checkbox"/> AS GROUND	<input type="checkbox"/> AS WELDED	<input type="checkbox"/> MACHINED	<input type="checkbox"/> SHOT BLASTED	<input checked="" type="checkbox"/> CLEAN BARE METAL
SURFACE TEMPERATURE	<input type="checkbox"/> < -4°C/ 20°F	<input type="checkbox"/> -4°C/ 20°F TO 10°C/ 50°F	<input checked="" type="checkbox"/> 10°C/ 50°F TO 52°C/ 125°F	<input type="checkbox"/> > 52°C/ 125°F	

RESULTS- (☐ METRIC ☐ IMPERIAL)

1	CROSSTUBE	W.O. ID	6937	ITEM ID	D407-667-205	AFT
2	"	W.O. ID	72017	ITEM ID	D212-664-101MB	FWD
3	"	W.O. ID	72254	ITEM ID	D212-664-101	FWD
4	"	W.O. ID	71825		D407-667-205	AFT
5	"	W.O. ID	71824		D407-667-205	AFT
6	"	W.O. ID	72260		D212-664-101	FWD
7	"	W.O. ID	71437		D212-664-201	AFT
8	"	W.O. ID	72018		D212-664-201MB	AFT
9	"	W.O. ID	71438		D212-664-201	AFT
10	RAPPEL	W.O. ID	69692	ITEM ID	D3011-1	
NO RELEVANT INDICATION WAS DETECTED AS PER APPLICABLE STANDARDS				PT 11-07-21		

Scope of Services

The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

Standard of Care

In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

SIGNATURES

CLIENT REPRESENTATIVE

TECHNICIAN (SIGNATURE):

NAME (PRINT):

IAN TITLEY
PRINT

IAN TITLEY
SIGNATURE

IVES DESROSIER
1ST TECHNICIAN

IVES DESROSIER
2ND TECHNICIAN

CGSB LEVEL 2
CGSB REG. NO. 3049

CGSB LEVEL 2
CGSB REG. NO. 3049

DTR # 24712

REPORT

REVIEWED BY:

NAME

INITIALS

WHITE - CLIENT COPY

CANARY - OFFICE COPY

PINK - TECHNICIAN COPY

GOLD - OFFICE COPY

PT Sept 2005

5.0 PARTS LIST

REFERENCE ONLY

5.1 HIGH GEAR CROSSTUBES

Item	-101	-201	-203	Part Number	Description
	X			D212-664-101	CROSSTUBE INSTALLATION, 204/205/210/212/214/412, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K HIGH FWD
		X		D212-664-201	CROSSTUBE INSTALLATION, 204/205/210/212/214, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K HIGH AFT
			X	D412-664-203	CROSSTUBE INSTALLATION, 412 HIGH AFT
1	1			D212-664-141	CROSSTUBE ASSEMBLY, 204/205/210/212/214/412, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K HIGH FWD
2		1		D212-664-241	CROSSTUBE ASSEMBLY, 204/205/210/212/214, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K HIGH AFT
3			1	D412-664-243	CROSSTUBE ASSEMBLY, 412 HIGH AFT
10	2			* D2893-1	SUPPORT
11	4			* D3595-063-450	RUBBER CUSHION
12	4			* MS21920-25	CLAMP (OR MS21042-26)
13	4			AN6-35A	BOLT
14	4			AN6-36A	BOLT
15	6			MS21042L6	NUT (OR MS21042-6)
16	18			AN960JD616	WASHER
20		2		* D2940-1	SUPPORT
21		4		* D3595-063-530	RUBBER CUSHION
22		4		* MS21920-28	CLAMP (OR MS21042-30)
23		4		AN6-40A	BOLT
24		2		AN6-41A	BOLT
25		6		MS21042L6	NUT (OR MS21042-6)
26		18		AN960JD616	WASHER
30			1	* D2896-1	SUPPORT
31			2	* D2856-600-1009	ABRASION STRIP
32			2	* D3595-063-570	RUBBER CUSHION
33			4	* MS21920-28	CLAMP
34			2	* MS21920-30	CLAMP (OR MS21042-32)
35			4	AN6-40A	BOLT
36			2	AN6-41A	BOLT
37			6	MS21042L6	NUT (OR MS21042-6)
38			18	AN960JD616	WASHER
39			2	* D3189-1	CHAFING SHIELD
50	1	1		D3428-1	PLACARD

*REFERENCE ONLY. PARTS ARE INCLUDED IN D212-664-141/-241 OR D412-664-243 ASSEMBLIES ABOVE
NOTE: KITS INCLUDE EXTRA HARDWARE FOR COMPATIBILITY WITH BOTH DART AND BELL/AA
SKIDTUBES.

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Revision: F
Date: 08.09.05